APPENDIX H
Detailed Project Lists with Analysis

NRV Hazard Mitigation Projects in Need of Federal and State Assistance

Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Regional (multiple jurisdictions)		*Note: Anything directly threatening life is valued at $2,000,000 or more.*						
Updated flood maps	Flooding; 1.4	More accurate flood maps to enable more effective development regulation; protective homes and lives. Estimated (33 homes @ $150,000) = $5,000,000	$50,000 per jurisdiction = **$750,000**	6.7	High	FEMA	NRVPDC and/or local govt.	3-5 years
Additional hazard, risk, damage and scientific data points	Flooding; Geologic; Wildfire, and Drought	Capturing damage data, more detailed risk data, critical infrastructure data, etc.; benefit estimated at $ 2 million plus, by guiding future development away from harms way.	$200,000	10.0	High	FEMA, VDEM	NRVPDC and/or local govt.	Ongoing
Regional Swift Water Rescue Team	Flooding; 1.1, 8.1	Atleast 5 lives have been lost in swift water in the NRV this year; allowed value per life saved = $2,000,000	Training and Equipment for 7 fire and rescue squad rep's = $500,000	4.0	High	FEMA, VDEM	Local Fire and Rescue Teams	Ongoing
Regional Reverse-911	All Natural and man-made; 1.1, 5.1, 8.1	Rapid dispatch to protect many lives = $10,000,000	17 entities (including VT & RU) @ $75,000 = $1,275,000	7.8	High	FEMA, VDEM	NRVPDC and local govt's.	2-3 years
Regional Water Supply Planning	Drought & Wildfire; 2.1, 2.2, 8.1	Research, coordination and planning to secure safe and adequate water supplies for drinking water, household, agricultural, commercial and industrial uses. Agricultural losses alone in most recent drought exceeded $10,000,000, so estimate = $20,000,000 +	$500,000	40.0	High	USDA, FEMA, VDEM	NRVPDC, Local govt's and PSA's	Ongoing
Regional Telecommunication Capacity and Interoperatibility	All Natural and man-made; 3.4, 8.1	Improved coordination within and among jurisdictions; increased communication reliability; quicker response times and improved access to total services; estimated 20 lives saved; benefit = $40,000,000	Broad-band and wireless services for local emergency services operations = $10,000,000	4.0	Medium	EDA, ARC, CDBG, FEMA, VDEM	NRVPDC and local govt's.	2-4 years
Regional Damage Assessment Team	All Natural and man-made; 8.2	Establishing a trained, equipped, and ready-to-respond group to open and speed assessment and access to fed and state help = $1,000,000	25 (5 per major juris) = $120,000	8.3	Low	VDEM	NRVPDC and/or VDEM.	1 year

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Regional Infrastructure and Debris Management Planning Model	All Natural and man-made; 8.1	Expedite removal of storm debris by identifying high-risk and neighborhood staging areas; with a goal of quick recovery and reduction of unnecessary landfill utilization = every acre saved = $1,000,000	$50,000 for each of 5 major jurisdiction $250,000	4.0	Low	FEMA, VDEM	NRVPDC	5 years

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Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Floyd County								
Water Resource Study	Drought, Wildfire and Flooding; 2.1, 2.2, 2.3, 3.4	Identify critical run-off, recharge areas and potential public well and reserves to meet demand; initial implementation; agric losses in recent drought = $4,000,000	$1,000,000	4.0	High	USDA, USGS, FEMA, VDEM	County administration	As funding becomes available
Communication equipment interoperatibility with surrounding areas	All natural and man-made; 3.4, 8.1	Improved coordination within and among jurisdictions; increased communication reliability; quicker response times and improved access to total services, multiple lives = $8,000,000	$500,000	16.0	High	FEMA/ Homeland Security	County administration	As funding becomes available
Develop Drought Contigency Plan	Drought and Wildfire; 2.1, 2.2, 2.3, 3.4	Again, given that 95% of the County lacks public water, a drought contingency plan is particularly important. In the recent drought, 500 private wells had to be replaced at an estimate cost of $2,500,000.	$50,000	50.0	High	USDA, FEMA, VDEM	County administration	As funding becomes available
Additional Water Sources and Reserves	Drought and Wildfire; 2.1, 2.2, 2.3, 3.4	Again, given that 95% of the County lacks public water, a drought contingency plan is particularly important. In the recent drought, 500 private wells had to be replaced at an estimate cost of $2,500,000; plus agriculture losses of $4,000,000 annually; plus threat of loss of 60 jobs at agri-tourism industry, $600,000 = $7,100,000	$2,500,000	2.8	High	CDBG, ARC, Tobacco Comm., USDA, FEMA, VDEM		As funding becomes available
Hazard-related GIS layers	All natural and man-made; 8.1	More accurate flood maps to enable more effective development regulation; protective homes and lives;ground and surface water resource data; water-resource usage by area; future water need Estimated = $10,000,000	$200,000	50.0	Medium	USGS, FEMA, VDOF, VMME, VDEM	County administration	As funding becomes available

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Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Additional Dry Hydrants	Wildfire; 3.4	Given the lack of a central water system in 95% of the County, additional dry hydrants are needed to supply firefighting efforts. Based on 100 homes at high risk *$100,000, the benefit could approach $10,000,000	$50,000	200.0	Medium	VDOF	VDOF	As funding becomes available

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Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Giles County								
Identify culvert replacement needs to reduce flooding.	Flooding; 1.2, 1.3, 1.6, 1.7	Engineering studies to determine appropriate size for problem culvert areas. Reduce future flooding, estimated value = $2,000,000+	$200,000	10.0	High	VDOT, USACOE	USACOE, VDOT, County administration	July, 2005
Replace culverts to reduce flooding.	Flooding; 1.2, 1.3, 1.6, 1.7	Reduce "damming" effect causing; Reduce future flooding, estimated value = $2,000,000+	25 culverts at $30,000 = $750,000	2.7	High	USACOE, VDOT, FEMA, VDEM	VDOT, County administration, USACOE	Ongoing
Structure Acquisition	Flooding; 1.2, 1.3, 1.6, 1.8		$100,000	8.0	High	FEMA, VDEM	County Admin, engineering	As funding becomes available
Emergency Services Coordinator Position	All natural and man-made; 1.4	Person to align and integrate emergency services; estimated value (life saved) = $2,000,000	$60,000	20.0	Medium	FEMA, VDEM, County	County Administration	January, 2006
A full-time state forester for Giles County	Wildfire: 3.1, 3.2, 3.3, 3.4, 3.5	Person to coodinate wildfire educate, mitigation and response; estimate value (life saved) = $2,000,000	$75,000	26.7	High	VDOF	County Administration	As funding becomes available
Pursue additional water sources	Drought and Wildfire; 2.1, 2.2, 2.3, 3.4	Reducing dependence on sole water supply well for public system through planning; improve long-term security; estimate = $2 million +	$50,000	40.0	Medium	USDA, FEMA, VDEM	County Administration	Ongoing

NRV Hazard Mitigation Projects in Need of Federal and State Assistance

Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Montgomery County								
Reverse 911 as emergency warning tool	All natural and man-made; 1.1, 5.1, 8.1	Will enable automated calling of 900 households per hour, vs. the current slow, dangerous, door-to-door notification now by Sheriff's Dept. = $2,000,000+	$51,000	39.2	High	FEMA, VDEM, County	County ESC & Sheriff	HMGP grant approved 2004 Implementation in 2005
Property acquisition in Floodprone Area	Flooding: 1.3, 1.5	Residential property acquisition in high-risk areas of Roanoke River watershed, wherever there is citizen willingness	$1,000,000		High	FEMA, VDEM, County	County ESC & Planning Dept.	2005 - 2010
Identification and Study of Village Floodplains: including GIS	Flooding; 1.4, 8.1	development in floodplain; more accurate maps would enable more effective regulation = est. $1,000,000 in future development	$50,000	33.3	High	FEMA, VDEM, County	County Planning Dept.	2005 - 2007
Flood Map Modernization	Flooding; 1.4, 8.1	More accurate flood maps to enable more effective development regulation; protective homes and lives. Estimated (10 homes @ $150,000) = $1,500,000	$150,000	10.0	High	FEMA	VA Tech & County Planning Dept.	2005 - 2008
Develop swift-water rescue capacity* (regional)	Flooding; 1.1, 8.1	Atleast 5 lives have been lost in swift water in the NRV this year; allowed value per life saved = $2,000,000	$100,000	20.0	High	FEMA, VDEM, County	County ESC	2004 - 2005
Equalization Basin	Flooding; 1.3, 1.6	Will enable protection of wastewater treatment plant in 100-year event; protecting thousands of public water drinkers downstream = $100,000/day; $1,000,000+ overall	Design, excavation, tank and installation = $250,000	4.0	High	FEMA, VDEM, County	PSA	2006
Pre-development database	Flooding; Geologic; Wildfire, and Drought	Full integration of zoning, permitting, building, 911 and real property info	$100,000		High	VDCR, FEMA, VDEM, VMME, VT	County ESC & Planning Dept.	Implementation 2005
More hazard-related GIS data	Flooding; Geologic; Wildfire, and Drought	Capturing damage data, more detailed risk data, critical infrastructure data, etc.	$100,000		Medium	VDCR, FEMA, VDEM, VMME, VT	County ESC & Planning Dept.	2004 - 2010
Additional I-FLOWS gauges	Flooding; 1.1, 1.3, 8.1	Enhance prediction and warning abilities; better protection for lives = $2,000,000+	$50,000	40.0	Medium	NOAA, NWS	NOAA/NWS, County ESC	2007 or as funding becomes available

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Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Public Education: flooding, wildfire, karst	All natural and man-made; 1.4, 8.1	Educating the public about hazards and threats to life and property and ways to minimize those threats = $2,000,000 +	$100,000	20.0	Medium	FEMA, VDEM, County	County ESC	2005 - 2010
Expand current karst mapping	Geologic; 1.4, 7.1	A karst feature inventory to enable, inform better development regulations & ordinances to limit future risks. Value of one home lost to sink hole=$150,000+	$50,000	3.0	Low	VDCR, FEMA, VDEM, VT	County Planning Dept.	2007
Shrink-swell Soil Mapping	Geologic; 1.4, 7.1	More accurate shrink-swell soil maps to enable more effective development regulation; protective homes and businesses. Past damage unknown. Potential home values in high hazard areas estimated to exceed $5,000,000	$50,000		Medium	VDCR, FEMA, VDEM, VT	County Planning Dept.	2005
Streambed-streambank restoration	Flooding: 1.3, 1.5; Drought	Reducing peak-flows and increasing recharge;	$50,000		Low	USACOE, VDOT, FEMA, VDEM	County Planning Dept.	2007 - 2010
Residential acquisition (landslide) on Elliot Creek	Flooding/landslide; 1.3, 1.6	Reducing repetitive loss structures (flooding and landslide) and threats to life= $2,000,000+	Acquisition & demolition of 2 structures = $153,000	13.1	Low	FEMA, VDEM, County	County Planning Dept.	HMGP Funding denied 2004
Acquisition of Plum Creek Area businesses	Flooding; 1.3, 1.5	Reducing repetitive loss structures and threats to life= $2,000,000+	Atleast 13 structures = $600,000	3.3	Low	FEMA, VDEM	County Planning Dept.	2007 - 2008

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Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Pulaski County								
Reverse 911/Early Warning System	All natural and man-made; 1.1, 8.1	Will enable automated calling of 900 households per hour, vs. the current slow, dangerous, door-to-door notification now by Sheriff's Dept. = $2,000,000+	Includes new system plus upgrading GIS records for integration= $75,000	26.7	High	FEMA, VDEM, USDA	County administration	June, 2007
Upgraded rescue and utility communication equipment	All natural and man-made; 1.1, 3.4, 8.1	Improved coordination within and among jurisdictions; increased communication reliability; quicker response times and improved access to total services; multiple lives saved = $5,000,000+	Includes broadband and wireless technology for emergency operations and utilities = $2,000,000	2.5	High	FEMA, VDEM, USDA	County administration	June, 2005
Additional IFLOWS rain and stream gauges	Flooding; 1.1, 1.3, 8.1	Enhance prediction and warning abilities; better protection for lives = $2,000,000+	$50,000	40.0	Low	NOAA, NWS	NOAA/NWS, Emergency Coordinator	April, 2005
Elevating homes	Flooding; 1.3	Elevating homes in high-hazard areas; willing participants not yet identified			High	FEMA, VDEM	Planning	Ongoing
Dredging of upper Claytor Lake	Flooding; 1.6	Dredging the upper end of Claytor Lake to enable additional storage capacity in flood events; help to downstream areas including Radford and Giles County; estimated value =$5,000,000	$1,500,000	3.3	Low	USACOE, FEMA, AEP	Planning	January, 2010
Upgrading New River Trail	Flooding; 1.1, 1.3, 1.4, 1.6	Upgrading the New River Trail for use during floods as a means of emergency transportation for residents in Allisonia.; value = $2,000,000	$500,000	4.0	High	FEMA, VDEM, TEA-21	Planning	May, 2008

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City of Radford								
Swift Water Rescue equipment & training* (regional)	Flooding; 1.1, 8.1	Atleast 5 lives have been lost in swift water in the NRV this year; allowed value per life saved = $2,000,000	$500,000	4.0	High	FEMA, VDEM	Fire chief	2005-2006
Tie-pile removal along New River	Flooding and wildfire; 3.5	Reduce flooding and wildfire risk of 1,000,000+ old railroad ties, piled along New River; also possible burning toxins putting lives at risk = $10,000,000+	$2,000,000	5.0	High	EPA, DEQ, FEMA, VDEM	City management	2008-2009
Detention Pond at Sunset Park	Flooding; 1.6	Reduce periodic flooding.	$1,000,000	NA	Medium	FEMA, VDEM, USACOE	City engineer	2004-2005
Regional Stormwater Detention along Connelly's Run	Flooding; 1.6, 8.1	Reducing peak flows from 5.45AC drainage area to reduce flooding in lower reaches.	$2,500,000	NA	Low	FEMA, VDEM, USACOE	City engineer	2008-2009

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Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Town of Blacksburg								
Series of Stormwater Detention ponds	Flooding; 1.6	Create a series of stormwater detention ponds to reduce peak-flow especially during 100-year event; last significant flood caused $4,000,000 in damage at VT	$1,000,000	4.0	High	USACOE, FEMA, VDEM	Town management, Virginia Tech	As funding becomes available
Hazard-related GIS layers	All ; 1.3, 8.1	More accurate flood, groundwater, geologic maps to enable more effective development regulation; protecting lives, natural resources, and homes. ; estimate $1,000,000 in future development redirected	$100,000	10.0	Medium	USGS, FEMA, VDOF, VMME, VDEM	Town planners and GIS	As funding becomes available
Creation of Development Guidelines for Wildfire Prevention	Wildfire; 3.1, 3.3	Improving ability and means to prevent future wildfire damage through development guidance; 10 homes could be saved @ $250,000 = $2,500,000	$25,000	100.0	High	FEMA, VDEM, VDOF	Town planners and GIS	As funding becomes available
Implement SCADA system for utility pressures	All ; 2.1, 2.3, 8.1	Allow monitoring of wastewater pump stations and water system pressures during power outages; estimate value $500,000	$170,000	2.9	Medium	FEMA, VDEM, VDOF	PSA	As funding becomes available
Provision of Back-up Power for critical infrastructures	All ; 3.5, 8.1	Allow water and wastewater systems to continue operations even during major power outages; estimated value in safety and business saved = $2,000,000	$200,000	10.0	Medium	FEMA, VDEM	PSA	As funding becomes available
Undergrounding Utilities	Wildfire, wind, winter weather; 5.1	Burying major utility lines to prevent outages and accidents related to natural hazards: estimated value in safety and business not lost =$10,000,000	$7,500,000	1.3	Low	FEMA, VDEM, CDBG, TEA-21	Public Works	As funding becomes available
Increase water storage	All ; 2.1, 2.3, 8.1	Increasing water storage capacity to serve both the Town and Virginia Tech; estimated value in security =$5,000,000	$2,000,000	2.5	Medium	FEMA, VDEM, CDBG	PSA	As funding becomes available

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Town of Christiansburg								
Floodplain GIS layer	Flooding; 1.3, 8.1	More accurate flood maps to enable more effective development regulation; protect homes and lives. Estimated (5 homes @ $150,000) = $750,000	$50,000	15.0	High	FEMA, VDEM	Town planners and GIS	FY 2007 (Pending FEMA Coordination)
Study of Series of Stormwater ponds	Flooding; 1.6	Reducing flooding on College St;	$100,000	not yet known	Medium	USACOE, FEMA, VDEM	Town management	As funding becomes available
Home acquisition	Flooding; 1.4, 1.5	purchase 8 homes (@$150,000);no information available on exact damage, but recurrent flooding and damage estimated at 15% of value plus life saved~ $ 2,000,000	$1,200,000	1.7	Low	FEMA, VDEM	Town management	As funding becomes available
Undergrounding utilities	Wildfire, wind, winter weather; 5.1	Burying utility lines to prevent outages and accidents; estimate value $4,000,000 in accidents and lost revenue	$2,000,000	2	Low	FEMA, VDEM	Town management	As development occurs

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Town of Narrows								
Stormwater facilities	Flooding; 1.6	Currently stormwater largely flows in open ditches on private property, resulting in frequent flooding; facilities would reduce frequency and impact of flooding to at	$2,500,000	3.9	High	CDBG, FEMA, VDEM	Town management	As funding becomes available
Replacement of Wastewater Treatment Plant	Flooding; 1.2	The Wastewater Treatment plan is currently in the floodway, and is subject to flooding. Estimate value = $2,000,000+	$1,500,000	1.3	High	USDA, FEMA, VDEM	Town management	As funding becomes available
Replacement for Critical Facilities Buildings in High-Hazard areas	Flooding & Earthquake; 1.2	The Town municipal building is located in the floodplain and is prone to frequent damage; the neighboring firehouse is also near a stream, plus it's a block/brick structure prone to Quake damage; either could be rendered totally ineffective by hazard events; estimate value = $2,000,000+	$1,000,000	2.0	Medium	USDA, FEMA, VDEM	Town management, local squad	As funding becomes available
Town of Pearisburg								
Replacement of Wastewater Treatment Plant	Flooding; 1.2	The Wastewater Treatment plan is currently in the floodway, and is subject to flooding. Estimate value = $7,000,000+	$7,000,000	1.3	High	USDA, FEMA, VDEM	Town management	As funding becomes available
Upgrade Stormwater System	Flooding; 1.6, 1.7	Improvements needed in 3 watersheds: Grand Avenue, Midtown, and Orchard Avenue to fix drainage system impacting 60+ structures. Estimate value = $3,000,000	$1,500,000	2.0	High	USDA, FEMA, VDEM	Town management	As funding becomes available

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Project Name	Hazards mitigated & Plan Goal/Objective	Benefit	Cost	Benefit-to-Cost Ratio	Priority	Funding Partners	Implementation / Lead Agency	Proposed Timeframe
Town of Pembroke								
Engineer Study of Structural Needs	Flooding; 1.3, 1.4, 1.5, 1.6	Corps of Engineers Study to assess structural remedies to flooding; most recent damage exceeded $400,000; overall estimate = $4,000,000	$100,000	40.0	High	USACOE, FEMA, VDEM, VDOT	USACOE, VDOT, County administration	As funding becomes available
Replace culverts/drainage	Flooding; 1.6, 1.7	Reduce "damming" effect causing; overall estimate = $4,000,000	10 culverts at $30,000 = $300,000	13.3	High	USACOE, FEMA, VDEM, VDOT	VDOT, County administration, USACOE	As funding becomes available
Early Warning System	Flooding; 1.1, 8.1	Automated communication system for emergency notification; life save, estimated = $2,000,000	$50,000	40.0	High	FEMA, VDEM	Town management, County coodinator	As funding becomes available
Streambank Clearance	Flooding; 1.6	Clearing debris and maintaining banks to prevent erosion and flooding. Estimated value = $1,000,000	$100,000	10.0	Medium	NRCS	Town management, County administration	As funding becomes available

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Town of Pulaski								
Channel dredging, straigtening	Flooding; 1.6	Very old channel through the Town does not hold major rain events; peak flow could be reduced by more rapid discharge of flood waters; channel contains questionable sediment washed to downstream water supplies in flood; estimate = $ 6,000,000	2 miles by 40' width by 5' depth = $5,000,000	1.2	High	USACOE, FEMA, VDEM, VDOT, EPA, DEQ	Town management, engineering	As funding becomes available
Replace or rehabilitate Railroad Bridge (acting as dam)	Flooding; 1.6	Reduce elevation of flood waters by opening flow impeded by railroad structure; probably the difference between downtown damage or not in 100-year event; estimate = $10,000,000 at risk	$1,000,000	10.0	High	USACOE, FEMA, VDEM, VDOT, N&S	Town management, engineering	As funding becomes available
Acquisition of other Repetitive Loss homes	Flooding; 1.4, 1.5	Reduce repetitive loss and decrease danger to lives; estimate = $2,000,000 +	$250,000	8.0	High	FEMA, VDEM	Town management, engineering	As funding becomes available
Integrated Early Warning System or Reverse 911	All natural and man-made; 1.1, 8.1	Automated communication system for emergency notification; life saved = $2,000,000	$50,000	40.0	High	FEMA, VDEM	Town and County emergency coordinator	As funding becomes available
Flood education/outreach	Flooding; 1.3, 1.4	Educating the public about hazards and threats to life and property and ways to minimize those threats = $2,000,000 +	$50,000	40.0	Medium	FEMA, VDEM	Town and County emergency coordinator	Ongoing

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Town of Rich Creek								
Replacement of Wastewater Treatment Plant	Flooding; 1.2	The Wastewater Treatment plan is currently in the floodway, and is subject to flooding. Estimate value = $10,000,000+	$7,000,000	1.3	High	USDA, FEMA, VDEM	Town management, PSA	As funding becomes available
Virginia Tech								
Continue natural resource work on Duck Pond	Flooding; 1.6, 1.7	Increase storage capacity ; estimated value = $1,000,000	$500,000	2.0	High	USACOE, FEMA, VDEM, NRCS	Virginia Tech Facilities management	As funding becomes available
Control of flood waters upstream from Virginia Tech Campus	Flooding; 1.6, 1.7	See Blacksburg	$1,000,000	See B'burg	High	USACOE, FEMA, VDEM	Town management, Virginia Tech	As funding becomes available
Hazard-related GIS layers	All natural; 1.3, 8.1	More accurate flood, groundwater, geologic maps to enable more effective development regulation; protecting lives, natural resources, and homes. Estimate 10 homes at $250,000 = $2,500,000	$50,000	50.0	Medium	USGS, FEMA, VDOF, VMME, VDEM	Virginia Tech safety management	As funding becomes available